

Tropic Regions Test Center

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A key element of U.S. military strategy is the ability to rapidly deploy, employ, sustain, and redeploy capabilities in geographically separate and environmentally diverse regions around the world. To support that strategy, U.S. military systems must be able to operate effectively and safely in the full range of natural environments found around the globe. The ability to operate in a tropic environment is especially critical as approximately three-fourths of all regional conflicts have taken place in tropical areas.

While some aspects of the natural environment can be recreated in test chambers, it is only through testing in the natural environment that the synergistic effects of all of the challenges posed by nature can be fully understood and evaluated. The detailed, realistic testing ensures U.S. military personnel from all services that their systems will function as intended in these environments.

The U.S. Army's Yuma Proving Ground (YPG), the Department of Defense (DoD) lead for natural environment testing, operates and maintains sites for testing the full range of military systems in cold, desert, and tropic environments. The Tropic Regions Test Center (TRTC) is a subordinate command of YPG (a subordinate command of the Developmental Test Command and the Army Test and Evaluation Command) and has the mission for planning and conducting testing of military systems in a tropic environment.

This article provides information on TRTC's capabilities as well as a review of the history of tropic testing and a listing of the key environmental challenges systems may encounter in a tropic environment.

Key words: Natural environment testing; Panama; realistic conditions; tropics.

While the origins of tropic testing by the U.S. military can be traced back to the early 1920s, efforts to establish a permanent tropic test capability did not begin until the early 1950s. At that time, the Panama Canal Zone was selected as the most appropriate site for tropic testing. However, due to funding problems, these plans were laid aside until 1962 when the U.S. Army established the U.S. Army Research and Development Office, Panama. The name was subsequently changed to the U.S. Army Tropic Test Center in 1964 and it evolved over the following years into what is now known as the Tropic Regions Test Center (TRTC).

Following the withdrawal of U.S. forces from Panama in 1999 (in accordance with the Panama Canal Treaty) and the relocation of TRTC to Yuma Proving Ground (YPG), the primary focus of TRTC's

efforts has been to rebuild the Department of Defense's (DoD) tropic test capabilities and to restore tropic testing workload to a sustaining level.

To support rebuilding these tropic test capabilities, YPG commissioned an independent scientific review of potential tropic test sites by a panel of experts assembled by the U.S. Army Research Office (ARO). The studies concluded that a suite of sites would offer the best technical approach. Based on this input, as well as the direction of higher headquarters and specific customer requirements, subsequent TRTC efforts focused on regaining access to sites in Panama and the establishment of test sites in Hawaii, Honduras, and Suriname (*Figure 1*).

TRTC's efforts have been extremely successful, as evidenced by ready access to tropic test sites in Panama, with additional sites in Hawaii, Honduras, and Suriname. Work at these sites has restored tropic test

Report Documentation Page			Form Approved OMB No. 0704-0188		
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1. REPORT DATE 2008		2. REPORT TYPE		3. DATES COVERED 00-00-2008 to 00-00-2008	
4. TITLE AND SUBTITLE Tropic Regions Test Center			5a. CONTRACT NUMBER		
			5b. GRANT NUMBER		
			5c. PROGRAM ELEMENT NUMBER		
6. AUTHOR(S)			5d. PROJECT NUMBER		
			5e. TASK NUMBER		
			5f. WORK UNIT NUMBER		
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) US Army Yuma Proving Ground,Tropic Regions Test Center ,Yuma,AZ,85365			8. PERFORMING ORGANIZATION REPORT NUMBER		
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)			10. SPONSOR/MONITOR'S ACRONYM(S)		
			11. SPONSOR/MONITOR'S REPORT NUMBER(S)		
12. DISTRIBUTION/AVAILABILITY STATEMENT Approved for public release; distribution unlimited					
13. SUPPLEMENTARY NOTES					
14. ABSTRACT					
15. SUBJECT TERMS					
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT Same as Report (SAR)	18. NUMBER OF PAGES 4	19a. NAME OF RESPONSIBLE PERSON
a. REPORT unclassified	b. ABSTRACT unclassified	c. THIS PAGE unclassified			



Figure 1. Tropic Regions Test Center test sites

workload to levels in excess of historical averages, reaching an all time high in FY 06.

Tropic environment—Characteristics and challenges

Two of the more common challenges found in the tropics are:

- Dense, old-growth forests with double or triple canopies that block sunlight and retain moisture from frequent, heavy rainfalls, while keeping the temperature nearly constant at 75 degrees Fahrenheit and the humidity level at 95–100 percent around the clock, all year long.
- Open areas of short or 20-foot tall grasses, mangrove swamps and coastal environments with year-round temperatures in the 80–95 degrees Fahrenheit range coupled with relative humidity in the 80–100 percent range.

The combination of climatic, biotic and geographical features found in the tropics can often lead to the following problems with military systems:

- Degradation in target detection and acquisition due to dense tropic vegetation, terrain, and climatic conditions.
- Blockage or degradation of tactical communications due to rugged terrain, dense foliage, and climatic conditions.
- High levels of heat stress due to temperature and humidity levels.
- Impeded foot and vehicle mobility due to steep slopes, frequent heavy rainfall, and weak soils.
- Obscuration of targets and degradation in weapon effectiveness due to jungle canopies and vegetation.

- Corrosion of metals, clogging or rusting of air ducts and tubing, shorting of electrical components and slippery surfaces due to heavy rains, high humidity, and fungal growth.
- Degradation of materials such as polymers, rubber, plastics, and paints due to solar radiation and high temperatures, which can cause cracked surfaces and allow moisture intrusion.
- Insect and microbiological damage and corrosion.

TRTC capabilities

TRTC operates and maintains an array of test sites in a variety of jungle and tropical open lands and coastal environments. Testing is accomplished by a combination of Army civilian personnel, support contractors, and (on occasion) borrowed military personnel. Key tropic test sites are described in the following paragraphs.

Panama provides a near “ideal” tropic environment and is the primary site for the testing of individual soldier systems and small caliber weapons. It is the primary location for support contractors. Key capabilities include:

- **Cerro Tigre Test Site** is a secure general purpose test area which includes a 700-meter small arms firing range, small arms storage bunkers, a manpack portability course, and a MOUT complex; it is located on a training academy operated by the Panamanian National Police (PNP) about 30 minutes from Panama City (*Figure 2*).
- **Pacora Test Site** is a leased site in a nearby area east of Panama City. It is used for the testing of sensor and communication systems in a triple canopy jungle environment with a nearby helipad.

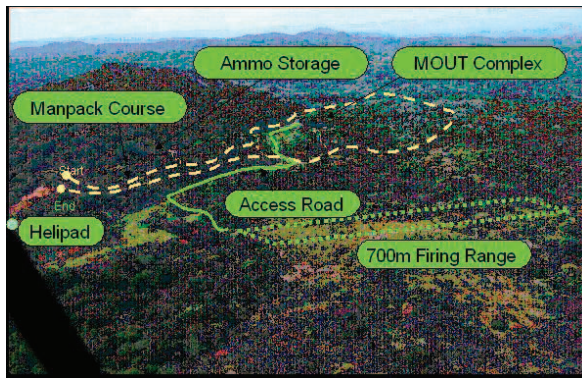


Figure 2. Cerro Tigre test site, Panama

- **Llano Carti Test Sites** are located on leased lands in a remote area further east of Panama City for testing of sensors in a triple canopy jungle environment with a nearby helipad.
- **North Coast Area Test Sites** include breakwater, coastal, open-inland and jungle test sites for the exposure testing of materials and systems across the full range of conditions (humidity, temperature, rainfall, solar radiation, salt spray, etc.) found in coastal and inland tropic areas. Testing at these sites is conducted through a Cooperative Research and Development Agreement (CRADA) with the Technical University of Panama.
- **Panama City Support Complex** is located in downtown Panama City and features office space, conference rooms, telecommunications capabilities, medical personnel and other general administrative support capabilities for test customers. It also serves as the operations center for the TRTC support contractor and the organization's approximately 35 test support personnel.

Tropic Test Site—Hawaii is located on the U.S. Army's Schofield Barracks on the island of Oahu. It is the primary site for the testing of mine, countermine and smoke obscurant systems and serves as a back-up test site for individual soldier systems and small caliber weapon systems (Figure 3). Its colocation with the 25th Infantry Division provides enhanced access to soldiers and the firing and training ranges operated and maintained by the 25th Infantry Division.

Tropic Test Site—Honduras is located near Mocerón in a remote area of eastern Honduras on an outpost manned and secured by the Honduran Army's 5th Infantry Battalion. Due to minimal electromagnetic "clutter" in this area, as well as its remoteness, it is ideal for the testing of sensitive systems, C4I systems and sensors (in partnership with the U.S. Army's Electronic Proving Ground and the Redstone Tech-



Figure 3. Man Pack Course, Hawaii

nical Test Center). A C-130 capable airstrip is located on the Honduran Army outpost.

Tropic Test Site—Suriname is located on the Suriname Aluminum Company, L.L.C. (a subsidiary of Alcoa) bauxite mining complex near Moengo in the northeastern part of Suriname. This site is used for the testing of heavy vehicles and leverages the existing support infrastructure (repair shops, maintenance facilities, housing, medical clinic, deep water port, etc.) associated with the bauxite mining operations.

Because TRTC operates in a number of foreign countries in the SOUTHCOM area of operations, access to test sites is closely coordinated with the command and U.S. embassies in each country. The relationships and agreements that have been developed combined with the experience of TRTC personnel in dealing with the nuances of conducting testing in a foreign country help to streamline and facilitate the test process for TRTC's customers.



Figure 4. Campo Victoria, Honduras

Summary

TRTC has successfully re-established itself as the premier Department of Defense (DoD) activity for testing in the challenging natural tropic environment. The test sites TRTC operates and maintains, combined with the skill and experience of its workforce, ensure realistic testing of equipment and systems. This

has led to an enhanced understanding of system and equipment performance, reliability, and safety when subjected to the unique climatic, biotic, and geographical challenges found in the tropics, and will continue to do so in the future. Further information on TRTC, as well as points of contact, can be found at http://www.yuma.army.mil/tc_trtc.shtml. □



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